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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Andre Bourdoux

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EXAMINER

PERILLA, JASON M

ART UNIT

PAPER NUMBER

2611

NOTIFICATION DATE

DELIVERY MODE

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/645,858	Applicant(s) BOURDOUX ET AL.	
	Examiner JASON M. PERILLA	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 28-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 and 28-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-24 and 28-44 are pending in the instant application.

Response to Amendment/Argument

2. The Applicant's remarks, filed March 27, 2009, have been fully considered.

In view of the Applicant's amendments to the claims, the rejections under 35 U.S.C. § 112, second paragraph, set forth in the office action dated September 30, 2008, have been withdrawn.

In view of the Applicant's amendments to the claims, new grounds of rejection are set forth below.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-11, 13-15, 21-24, 28-38, and 40-42 are rejected under 35 U.S.C. § 102(e) as being anticipated by Walton et al (U.S. Pub. No. 2002/0154705; "Walton").

Regarding claim 1, Walton discloses a method of transmitting data signals from at least one transmitting terminal (fig. 3) with a spatial or "antenna" diversity (§ 0042; §§ 0046-47; § 0052; fig. 3, ref. 116) capability to at least two receiving user terminals (§ 0035; "a number of receiver units), each having a spatial diversity receiving capability

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(fig. 6, ref. 610), the method comprising: dividing (fig. 3, ref. 310) data signals (fig. 3, "AGGREGATE INPUT DATA STREAM") into a plurality of streams (fig. 3, "S1" – "Sk") of sub-user data sub-signals; determining combined data signals (fig. 3, refs. 332, 334, and 320; outputs from CHANNEL DATA PROC, "V1" - "Vnt" and/or outputs from IFFT blocks 320) in at least one transmitting terminal, said combined data signals being transformed versions of said streams of data sub-signals (§ 0104), said determining being designed such that at least one spatial diversity device (i.e., fig. 6, refs. 610) of the receiving user terminals (fig. 6) only receives data sub-signals being specific for the corresponding receiving user terminal (§ 0037; § 0075; "beam steering") and having interference between at least two streams of the plurality of streams of sub-user data sub-signals (inherent; see discussion below); inverse sub-band processing (fig. 3, ref. 320) of said combined data signals; transmitting (fig. 3, ref. 116) with said at least one spatial diversity device said inverse sub-band processed combined data signals; receiving (fig. 6; § 0123) data signals on at least one of said receiving terminals by at least one spatial diversity (fig. 6, ref. 610; spatial diversity is evidenced by the plurality of reception antennas 610) receiving device, said received data signals being at least a function of said inverse subband processing of said combined data signals; determining (fig. 6, ref. 612) on at least one of said receiving terminals estimates or "demodulated samples" (§ 0123) of said data sub-signals from said received data signals; and collecting (fig. 6, ref. 620) said estimates of said data sub-signals into estimates of said data signals (fig. 6, output of decoders 640). As broadly as claimed, each combined data signal must necessarily be "having interference between at least two streams of

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the plurality of streams” because, once all combined data signals are transmitted, they will (inherently) mix and interfere with each other.

Regarding claim 2, Walton discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Walton discloses that said transmission of said inverse subband processed combined data signals is simultaneous because each of Walton’s antennas (fig. 2, ref. 116) is capable of simultaneous transmission (§ 0107).

Regarding claim 3, Walton discloses the limitations of claim 1 as applied above. Furthermore, Walton discloses the use of OFDM modulation (§§ 0048-49). As is notoriously known, OFDM subcarriers overlap, at least partly, in their individual bandwidths. (Official Notice is taken on this fact. See generally, U.S. Pub. No. 2003/0169824 to Chayat, fig. 3a, ref. 306 for a representation of overlapping OFDM subcarriers or subbands.)

Regarding claim 4, Walton discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Walton discloses that determining combined data signals in said transmitting terminal is carried out on a subband by subband basis (§ 0049).

Regarding claim 5, Walton discloses the limitations of claim 1 as applied above. Further, as broadly as claimed, Walton discloses that determining said estimates of said data sub-signals in said receiving terminals comprises subband processing (i.e. “channelizes the stream . . . into a number of sub-channel symbol streams”; § 0123).

Regarding claim 6, Walton discloses the limitations of claim 5 as applied above. Further, Walton discloses that said subband processing comprises orthogonal

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frequency division demultiplexing (i.e. "all sub-channel symbol streams used for the transmission of the channel data stream are presented to a MIMO processor that orthogonalizes the received modulation symbols in each sub-channel"; ¶ 0125).

Specifically, Walton's transmission of OFDM sub-channels or sub-bands requires an inverse OFDM demodulation technique on the side of reception.

Regarding claim 7, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that determining combined data signals in said transmitting terminal comprises: determining intermediate combined data signals (fig. 3, outputs of CHANNEL DATA PROC 332) by subband processing said data signals (¶ 0107); and determining said combined data signals (fig. 3, refs. 334 and 320) from said intermediate combined data signals (¶ 0102).

Regarding claim 8, Walton discloses the limitations of claim 7 as applied above. Further, Walton discloses, as broadly as claimed, that said subband processing by CHANNEL DATA PROC 332 comprises orthogonal frequency division demultiplexing (see fig. 4A, refs. 420 and 430). It performs the same operation as the subband processing of the instant application. Namely, it determines the information for a subband which is to be "multiplexed" via OFDM multiplexing (¶ 0102 -0107).

Regarding claim 9, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that said inverse subband processing comprises orthogonal frequency division multiplexing (¶ 0104).

Regarding claim 10, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that said subbands, being involved in inverse subband

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processing, are grouped into sets, at least one set comprising at least two subbands (§ 0102); determining combined data signals in said transmitting terminal comprises: determining relations (i.e. SPATIAL and COMBINATION relations; §§ 0109-0114) between said data signals and said combined data signals on a set-by-set basis; and exploiting said relations between said data signals and said combined data signals for determining said data signals.

Regarding claim 11, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that in said inverse subband processed combined data signals a guard interval is introduced (fig. 3, ref. 322).

Regarding claim 13, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams of data sub-signals is variable because the implementation of combinations of the sub-signals is variable (§ 0099). See generally, the description of figures 5A and 5B. Walton's diversity technique is flexible in that it can implement various types of diversity for particular users over particular periods of time (fig. 2).

Regarding claim 14, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams is selected in order to minimize the error between said estimates of said data sub-signals and said data sub-signals (§ 0099, § 0108).

Regarding claim 15, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses that the number of said streams is selected in order to minimize the bit error rate (§ 0099, § 0108).

Regarding claim 21, Walton discloses the limitations of the claim as applied to claim 1 above. Furthermore, Walton discloses transmitting signals to at least two receiving user terminals (i.e., more than two antennas, fig. 6, refs. 610).

Regarding claim 22, Walton discloses the limitations of claim 21 as applied above. Further, Walton discloses that said circuitry configured to combine data signals comprises a plurality of circuits (fig. 3, refs. 332, 334, and 320) each configured to combine data signals based at least on part of the subbands of said data sub-signals as applied above.

Regarding claim 23, Walton discloses the limitations of claim 21 as applied above. Further, Walton discloses that said spatial diversity transmitter comprises at least two transmitters (fig. 3, refs. 114) and said circuitry configured to transmit inverse subband processed combined data signals comprises a plurality of circuits (fig. 3, refs. 320), each being configured to transmit said inverse subband processed combined data signals with one of said transmitters of said spatial diversity device.

Regarding claim 24, Walton discloses the limitations of the claim as applied to claim 1 above.

Regarding claims 28-38, Walton discloses the limitations of the claims as applied, respectively, to claims 1-11 above.

Regarding claims 28-38, Walton discloses the limitations of the claims as applied, respectively, to claims 1-11 above.

Regarding claims 40-42, Walton discloses the limitations of claim 28 as applied above. Further, Walton discloses the remaining limitations of the claims as applied, respectively, to claims 13-15 above.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 12, 16-20, and 39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton in view of Walton et al (U.S. Pub. No. 2003/0125040; "Walton '040").

Regarding claim 12, Walton discloses the limitations of claim 1 as applied above. Further, Walton discloses the use of channel state information (CSI) in the sub-channel processing (¶ 0113). Walton does not explicitly disclose the transmitter and receiver linear filtering which is commonly associated with the use of CSI. However, Walton '040 discloses, in a strictly analogous field of art, the use of linear matched filters at the sides of the transmitter and receiver for channel characterization (¶ 0091). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made that the method of Walton could be modified to utilize linear transmitter and receiver filtering for determining the CSI as suggested by Walton '040 because it could accurately predict the channel. The transmitter filter and receiver filters are determined on a "per-user" basis because they are respective to each transmitter and receiver.

Regarding claim 16, Walton in view of Walton '040 disclose the limitations of the claim as applied to claim 1 and 12 above.

Regarding claims 17 and 18, Walton in view of Walton '040 disclose the limitations claim 16 as applied above. Further, Walton discloses the remaining limitations of the claims as applied, respectively, to claims 2 and 3 above.

Regarding claim 19, Walton in view of Walton '040 disclose the limitations of claim as 16 as applied above. Further, Walton discloses that said transformation of said data sub-signals to transformed data sub-signals comprises inverse subband processing (i.e. IFFT; fig. 3, ref. 320a).

Regarding claim 20, Walton in view of Walton '040 disclose the limitations claim 16 as applied above. Further, Walton discloses the remaining limitations of the claim as applied to claim 7 above.

Regarding claim 39, Walton discloses the limitations of claim 28 as applied above. Further, Walton in view of Walton '040 disclose the remaining limitations of the claim as applied to claim 12 above.

Regarding claim 43, Walton in view of Walton '040 disclose the limitations of claim 16 as applied above. Further, Walton '040 discloses that the filtering is "linear" filtering (§ 0090).

Regarding claim 44, Walton in view of Walton '040 disclose the limitations of claim 16 as applied above. Further, as broadly as claimed, Walton discloses eliminating the interference between the at least two streams of the estimates of the data sub-signals (fig. 6, refs. 630 and 630). As is known in the art, the processes of processing

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and decoding a received signal will, inherently, reject any extraneous interference imposed upon a received signal.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. PERILLA whose telephone number is (571)272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jason M Perilla/
Primary Examiner, Art Unit 2611
April 29, 2009

/jmp/